NOTES TO ARCHITECT

Design your project using the "soft" metric system for reinforcing steel (as described under ASTM A 615 / A 615M) and indicate "soft" metric sizes on the drawings.

SECTION 03200 - CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

As specified in Section 00700.

1.02 SUBMITTALS

Submit certified mill test results or laboratory test results for all reinforcing steel indicating the following: bar size; yield strength; ultimate tensile strength; elongation and; bend test. Rebar chemical composition shall be provided for rebars which are to be welded.

Delete for other than Seismic Zone 3 and 4 facilities. **(Req'mt source: UBC(1994) 1921.2.5.1)**

PART 2 - PRODUCTS

2.01 MATERIALS

A. Reinforcing steel shall be deformed bars conforming to ASTM A 615 **/ A 615M**, grade as shown on plans.

B. Welded wire fabric for concrete reinforcement shall conform to ASTM A185 and shall be galvanized.

C. Accessories such as spacers, chairs, ties, and other devices necessary for properly placing, supporting and fastening reinforcement in place shall be provided. Annealed steel wire of not less than 16-gauge shall be used to secure reinforcement.

Indicate grades of steel to be used in plan general notes (**e.g. Grade** 40 for stirrups and tie**s, Grade** 60 or 75 for main reinf.). In addition, when rebars are to be welded, specify reinforcing steel conforming to ASTM A706 or ASTM A 615 **/ A 615M** with preheat, **and other applicable criteria. Note: The ASTM A 615 / A 615 M std. does not include specific provisions to enhance the weldability of the steel. Therefore, when welding of steel conforming to this std. is permitted, refer to the ASTM std. for recommendations and requirements.**

PART 3 - EXECUTION

3.01 TOLERANCES

A. Bars used for concrete reinforcement shall meet the following requirements for fabricating tolerances:

Sheared length: ±1 inch

Depth of truss bars: +0, -1/2"

Overall dimensions of stirrups, ties, and spirals: ±1/2"

All other bends: ±1 inch

Delete reference to welded wire fabric when concrete toppings not used.

NOTES TO ARCHITECT

B. Bars shall be accurately placed and adequately supported before the concrete is placed and shall be secured against displacement within the following tolerances:

Minimum distance between bars: -1/4"

d	**Tolerance on d:**	**Tolerance on the minimum concrete cover:**
d 8"	**± 3/8"**	**-3/8"**
d > 8"	**± 1/2"**	**-1/2"**

Where d = Distance from the extreme compression fiber to the centroid of tension reinforcement.

Exception: **1. The tolerance for the clear distance to formed soffits (exposed underside of beams and slabs)shall be -1/4".**

2. The tolerance for cover shall not exceed minus one-third the minimum concrete cover required under Section 3.02 H.

Longitudinal location of bends and ends of reinforcement: ± 2" except at discontinuous ends of members where tolerance shall be ± 1/2".

Spacing of repetitious bars in walls and slabs: ± 2" except where openings, inserts and embedded items might require some additional shifting of bars. The total number of bars specified shall be maintained.

Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed the above tolerances, the resulting arrangement of bars shall be subject to approval by the Engineer.

3.02 REINFORCEMENT

A. Reinforcing steel bars, wire and wire fabric shall be provided in the sizes, lengths and configurations as indicated on plans and shall be thoroughly cleaned, before placing, of loose mill scale, loose flaky rust, oil, and all coatings that will destroy or reduce bond. If

Delete reference to welded wire fabric when concrete topping is not used.

NOTES TO ARCHITECT

necessary, they shall be cleaned again before placing of concrete. All items shall be fabricated, positioned and secured in place as indicated in the plans and as herein specified. Annealed steel wire shall be used to secure reinforcement.

Reinforcement shall be placed in specified positions not exceeding the tolerances listed in Sub-section 3.01. Unless otherwise noted, cleaning, bending and placing of reinforcement shall be done in accordance with the standard practice of the Concrete Reinforcing Steel Institute.

B. Concrete or metal support and spacers shall be used to secure the proper spacing of reinforcement over formwork. Stirrups shall be accurately and securely wired to the bars at both top and bottom. At slabs, footings and beams in contact with earth, pre-cast concrete blocks (not bricks or hollow tile) or chairs shall be used to hold reinforcement at a proper distance above earth.

C. Bars shall be tied at all intersections, and distances from forms shall be maintained by means of pre-cast concrete blocks, ties, hangers, chairs or other approved supports.

D. Bars shall be bent cold to the shapes shown on the plans. Bends shall be made around a pin having a diameter not less than 6 times the bar diameter except that for bars of larger than 1 inch diameter the pin diameter shall be 8 times the bar diameter. If required, bars may be bent in the field using a "hickey" bar.

E. All reinforcing steel bars shall be furnished in the lengths indicated on the plans. Splicing of bars, except where shown **or indicated**, will not be permitted without the approval of the Engineer. Splices where permitted shall be staggered as far as possible, wired together in such a manner as to maintain the clear depth of the member and the minimum clear distance to the surface of concrete. Unless otherwise shown on the plans, splices shall be lapped in lengths as follows:

#**36** bars and smaller 48d or 24 inches, whichever is larger.

Welded splices only shall be used **where shown on the structural drawings and where permitted by the Engineer**.

Welding shall conform to **ANSI/**AWS D1.4,

Specify submittal of shop drawing only if absolutely required by structural engineer.

Modify lap requirement to suit your job conditions. If all lap requirements are to be shown on drawings, delete given lengths and modify paragraph to read, "...and shall be lapped (in lengths as follows) as shown on the structural plans." (Delete bracketed phrase and add underlined phrase.)

NOTES TO ARCHITECT

Structural Welding Code - Reinforcing Steel. The Contractor shall notify the Engineer 48 hours prior to making any welded splices.

Change length of splice to suit the grade of steel used.

F. Vertical bars in columns shall be offset at least one bar diameter at splices.

Indicate where welded splices will be allowed on the drawings.

G. Unless permitted by the Engineer, reinforcement shall not be bent after being partially embedded in hardened concrete. Improperly and/or excessively bent bars shall be replaced.

H. Minimum concrete protective covering for reinforcement, except for extremely corrosive atmosphere, other severe exposures, or fire protective covering shall be as follows:

In corrosive environments or severe exposure conditions, the amount of concrete protection shall be increased to provide the necessary protection.

Concrete cast against and permanently exposed to earth..... 3"

Concrete cast against earth and deposited below the water table..... 6"

Formed concrete in contact with the earth or exposed to the weather: (except not less than 1-1/2 times the maximum size of aggregate for column spirals or ties)
- **#16 or smaller..... 1-1/2"**
- **#19 - #57..... 2"**

Formed concrete not exposed to the weather or in contact with the ground:
- **Slabs, walls and joists:**
  - **#36 or smaller..... 3/4"**
  - **#43 and #57..... 1-1/2"**
- **Beams, girders and columns**
  - **Primary reinforcement, ties, stirrups, spirals..... 1-1/2"**

I. Dowels (minimum #**10** @ 24 inches o.c. unless otherwise shown in the plans) shall be installed in all concrete to which masonry walls abut.

Provide typical detail on plans. Dovetail anchors shall not be used.

J. All reinforcement shall be inspected and approved by the Engineer prior to the closing of forms. This approval, however, shall not be construed to relieve the Contractor of his responsibility to place all reinforcement in accordance with the plans.

NOTES TO ARCHITECT

END OF SECTION